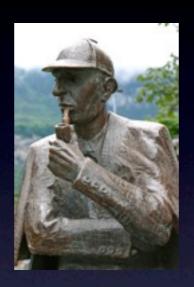
Using Data to Constrain Models

Peter Skands (CERN PH-TH)

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Disclaimer



"It is a huge mistake to theorize before one has data - One tends to twist fact to suit theory, instead of theory to suit fact"

Sherlock Holmes (2009)

Count what is Countable

Measure what is Measurable

(and keep working on the beam)

G. Galilei

Models
Amplitudes
Monte Carlo
Resummation
Strings

Theory

Feedback Loop

Experiment

Hits 0100110 GEANT B-Field

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Theory worked out to

Particle Level

with acceptance cuts (~ detector-independent)

Measurements corrected to

Particle Level

with acceptance cuts (~ model-independent)

If not worked out to hadron level: data must be unfolded with someone else's hadron-level theory

Unfolding beyond hadron level dilutes precision of raw data (Worst case: data unfolded to ill-defined 'MC Truth' or 'parton level')

Monte Carlo Truth

- Example: Drell-Yan pt distribution.
 - Measured: final-state leptons (+ photons)
 - **QED** is "known" use MC/model to correct back to "True Z boson"
 - Now can compare to theory without QED

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The "Q" in QED

• "MC Truth" is: useful indicator of dominant path.

Equivalent to Young knowing which slit the photon passed through!

In Quantum Mechanics

- Photons emitted off other particles interfere with those from Z decay no unique FSR correction
- Leptons from Z decay may interfere with other leptons in event no unique lepton assignment
- "MC Truth" is not: quantum mechanically meaningful

See also Hesketh et al., in arXiv:1003.1643

A "Les Houches" Proposal

G. Hesketh et al., in arXiv:1003.1643

- While it is <u>essential</u> to provide the data in terms of observables, it may still be <u>desirable</u> to derive further theoretical corrections ...
- We recommend such correction factors be provided in table(s), rather than being applied to the data.
- Using such tables, (the inverse of) such corrections could also be applied to allow direct comparisons of other models to the data while maintaining the separation of measurement and theory

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